

(c) DNA sequences which on expression code for a polypeptide coded for on expression by any of the foregoing DNA sequences and inserts.

38. The recombinant DNA molecule according to claim 37, wherein said DNA sequence (b) which hybridizes to said DNA insert (a) is selected from the group consisting of the hybridizing portion of each of:

HchrIF-A, the subcloned HindIII fragment of chr 3 in E.coli HB101;

HchrIF-B, the subcloned EcoRI fragment of chr 12 in E.coli HB101;

HchrIF-C, the subcloned HindIII fragment of chr 12 in E.coli HB101;

HchrIF-D, the subcloned EcoRI fragment of chr 13 in E.coli HB101;

HchrIF-E, the subcloned EcoRI fragment of chr 23 in E.coli HB101;

HchrIF-F, the subcloned HindIII fragment of chr 23 in E.coli HB101;

HchrIF-G, the subcloned EcoRI fragment of chr 26 in E.coli HB101; and

HchrIF-H, the subcloned HindIII fragment of chr 26 in E.coli HB101.

39. The recombinant DNA molecule according to claim 3 comprising a DNA sequence selected from the group consisting of DNA sequences of the formula:

ATGGCCTGCCCTTGCTTACTGATGGCCTGGTGGTGCTCAGCTGCAAGTCAGC  
TGCTCTCTGGGCTGTGATCTCCCTGAGACCCACAGCCTGGATAACAGGGAGCACCTG  
ATGCTCCTGGCACAAATGAGCAGAATCTCTCCTCCTGTCTGATGGACAGACAT

GA CTTGGATTCCCCAGGAGGAGTTGATGGCAACCAGTCCAGAAGGCCTCAGCC  
ATCTCTGCTCCTCCATGAGCTGATCCAGCAGATCTCAACCTTTACCACAAAAGAT  
TCATCTGCTGCTGGATGAGGACCTCTAGACAAATTCTGCACCGAACTCTACAG  
CAGCTGAATGACTTGAAGCCTGTGTGATGCAGGAGGAGAGGGTGGAGAAACTCCC  
CTGATGAATGCGGACTCCATCTGGCTGTGAAGAAATACTTCCGAAGAACATCACTCTC  
TATCTGACAGAGAAGAAATACAGCCCTGTGCCTGGAGGTTGTCAGAGCAGAAATC  
ATGAGATCCCTCTTTATCAACAAACTTGCAAGAAAGATTAAGGAGGAAGGAA

and

TGTGATCTCCCTGAGACCCACAGCCTGGATAACAGGAGGACCTTGATGCTCCTGGCA  
CAAATGAGCAGAACATCTCCTCCTCCTGTCTGATGGACAGACATGACTTTGGATTT  
CCCCAGGAGGAGTTGATGGCAACCAGTTCCAGAAGGCTCCAGCCATCTGTCCCTC  
CATGAGCTGATCCAGCAGATCTCAACCTTTACCACAAAGATTCATCTGCTGCT  
TGGGATGAGGACCTCCTAGACAAATTCTGCACCGAACTCTACCAGCAGCTGAATGAC  
TTGGAAGCCTGTGTGATGCAGGAGGAGAGGGTGGAGAAACTCCCTGATGAATGCG  
GA CTCATCTGGCTGTGAAGAAATACTTCCGAAGAACATCACTCTATCTGACAGAG  
AAGAAATAACAGCCCTGTGCCTGGAGGTTGTCAGAGCAGAAATCATGAGATCCCTC  
TCTTTATCAACAAACTTGCAAGAAAGATTAAGGAGGAAGGAA.

40. The recombinant DNA molecule according to  
claim 37 comprising a DNA sequence selected from the group  
consisting of DNA sequences of the formula:

TTACTGGTGGCCCTCCTGGTGTCAAGCTGCAAGCTGCTCTGTGGCTGTGAT  
CTGCCCTCAAACCCACAGCCTGGTAGCAGGAGGACCTTGATGCTCCTGGCACAGATG  
AGGAGAACATCTCTCTTCTCCTGCTTGAAGGACAGACATGACTTTGGATTTCCCCAG  
GAGGAGTTGGCAACCAGTCCAAAAGGCTGAAACCATCCCTGTCCATGAGATG  
ATCCAGCAGATCTCAATCTTCAGCACAAAGGACTCATCTGCTGCTGGATGAG  
ACCCTCCTAGACAAATTCTACACTGAACCTACAGCAGCTGAATGACCTGGAAAGCC  
TGTGTGATACAGGGGGTGGGGGTGACAGAGACTCCCTGATGAAGGAGGACTCCATT  
CTGGCTGTGAGGAAATACTTCCAAAGAACATCACTCTATCTGAAAGAGAAGAAATAC  
AGCCCTTGTGCCTGGAGGTTGTCAGAGCAGAAATCATGAGATCTTTCTTGTCA  
ACAAACTTGCAAGAAAGTTAAGAAGTAAGGAA and

TGTGATCTGCCTCAAACCCACAGCCTGGTAGCAGGAGGACCTTGATGCTCCTGGCA  
CAGATGAGGAGAATCTCTTTCTCCTGTTGAAGGACAGACATGACTTTGGATT  
CCCCAGGAGGAGTTGGCAACCAGTCCAAAAGGCTGAAACCATCCCTGTCCTCCAT  
GAGATGATCCAGCAGATCTCAATCTTCAGCACAAAGGACTCATCTGCTGCTTGG  
GATGAGACCCCTCCTAGACAAATTCTACACTGAACTCTACCAGCAGCTGAATGACCTG  
GAAGCCTGTGTGATAACAGGGGTGGGGTGAAGAGACTCCCCTGATGAAGGAGGAC  
TCCATTCTGGCTGTGAGGAAATACTTCAAAGAACATCACTCTATCTGAAAGAGAAG  
AAATACAGCCCTGTGCCTGGAGGTTGTCAGAGCAGAAATCATGAGATCTTTCT  
TTGTCAACAAACTTCAAGAAAGTTAAGAAGTAAGGAA

41. The recombinant DNA molecule according to  
claim 37 comprising a DNA sequence selected from the group  
consisting of DNA sequences of the formula:

ATGGCCCTGTCTTTCTTACTGATGCCGTGCTGGTGCCTCAGCTACAAATCCATC  
TGTTCTCTGGCTGTGATCTGCCTCAGACCCACAGCCTGGTAATAGGAGGACCTTG  
ATACTCCTGCAACAAATGGGAAGAACATCTCTCATTCTCCTGCCTGAAGGACAGACAT  
GATTTCGGATTCCCCGAGGAGGAGTTGATGCCACCAAGTTCCAGAACAGACTCAAGCC  
ATCTCTGTCCTCCATGAGATGATCCAGCAGACCTTCAATCTTCAGCACAGAGGAC  
TCATCTGCTGCTGGAACAGAGCCTCTAGAAAAATTTCACGAACTTTACCAAG  
CAACTGAATGACCTGGAAGCATGTGTGATAACAGGAGGTTGGGTGGAAGAGACTCCC  
CTGATGAATGTGGACTCCATCCTGGCTGTGAGGAAATACTTCAAAGAACATCTT  
TATCTAACAGAGAAGAAATACAGCCCTGTGCCTGGAGGTTGTCAGAGCAGAAATC  
ATGAGATCCCTCTGTTCAACAAACTGCAAAAAGATTAAGGAGGAAGGAT

and

TGTGATCTGCCTCAGACCCACAGCCTGGTAATAGGAGGACCTTGATACCTGC  
CAAATGGGAAGAACATCTCTCATTCTCCTGCCTGAAGGACAGACATGATTCGGATTC  
CCCGAGGAGGAGTTGATGCCACCAAGTTCCAGAACAGACTCAAGCCATCTGTCCTC  
CATGAGATGATCCAGCAGACCTTCAATCTTCAGCACAGAGGACTCATCTGCTG  
TGGGAACAGAGCCTCTAGAAAAATTTCACGAACTTTACAGCAACTGAATGAC  
CTGGAAAGCATGTGTGATAACAGGAGGTTGGGTGGAAGAGACTCCCCTGATGAATGT  
GACTCCATCCTGGCTGTGAGGAAATACTTCAAAGAACATCACTTTATCTAACAGAG

AAGAAATACAGCCCTTGTGCCTGGGAGGTTGTCAGAGCAGAAATCATGAGATCCCTC  
TCGTTTCAACAAACTTGCAAAAAAGATTAAGGAGGAAGGAT.

42. The recombinant DNA molecule according to claim 37, wherein said DNA sequence is operatively linked to an expression control sequence.

43. The recombinant DNA molecule according to claim 42, wherein said expression control sequence controls the expression of genes of prokaryotic or eukaryotic cells and their viruses.

44. The recombinant DNA molecule according to claim 43, wherein said expression control sequence is selected from the group consisting of a lac system, a  $\beta$ -lac system, a trp system, major operator and promotor regions of phage  $\lambda$ , and the control region of fd coat protein.

45. The recombinant DNA molecule according to claim 37 selected from the group consisting of C8-IFN- $\alpha$ 1, C8-IFN- $\alpha$ 2, LAC-AUG( $\alpha$ 2) and  $\beta$ -lac-AUG( $\alpha$ 2).

46. A host cell transformed with at least one recombinant DNA molecule according to claim 37.

47. The host cell of claim 46 selected from the group consisting of bacteria, yeasts, mouse or other animal hosts, and human tissue cells.

48. The transformed host cell according to  
claim 46 selected from the group consisting of E.coli  
HB101(Z-pBR322(Pst)/HcIF-II-206) and E.coli HB101 (Z-  
pBR322(Pst)/HcIF-SN35-AHL6).

49. The transformed host cell according to  
claim 46 selected from the group consisting of HchrIF-A,  
wherein HchrIF-A is the subcloned HindIII fragment of  
chr 3 in E.coli HB101; HchrIF-B, wherein HchrIF-B is the  
subcloned EcoRI fragment of chr 12 in E.coli HB101;  
HchrIF-C, wherein HchrIF-C is the subcloned HindIII  
fragment of chr 12 in E.coli HB101; HchrIF-D, wherein  
HchrIF-D is the subcloned EcoRI fragment of chr 13 in  
E.coli HB101; HchrIF-E, wherein HchrIF-E is the subcloned  
EcoRI fragment of chr 23 in E.coli HB101; HchrIF-F,  
wherein HchrIF-F is the subcloned HindIII fragment of  
chr 23 in E.coli HB101; HchrIF-G, wherein HchrIF-G is the  
subcloned EcoRI fragment of chr 26 in E.coli HB101;  
HchrIF-H, wherein HchrIF-H is the subcloned HindIII  
fragment of chr 26 in E.coli HB101; HchrIF-I, wherein  
HchrIF-I is the subcloned HindIII/BamH1 fragment of chr 35  
in E.coli HB101; and HchrIF-J, wherein HchrIF-J is the  
subcloned BamH1 fragment of chr 35 in E.coli HB101.

50. The transformed host cell according to  
claim 46 selected from the group consisting of E.coli  
DS410 (C8-IFN- $\alpha$ 1), E.coli DS410 (C8-IFN- $\alpha$ 2), E.coli DS410  
(LAC-AUG( $\alpha$ 2)), E.coli DS410 HB101 ( $\beta$ lac-AUG( $\alpha$ 2)) and Mouse  
3T3 (polyoma-Hif-chr35).

51. A method for producing a recombinant DNA molecule comprising the step of introducing into a cloning vehicle a DNA sequence selected from the group consisting of

(a) the DNA inserts of Z-pBR322(Pst)/HcIF-II-206 and Z-pBR322(Pst)/HcIF-SN35-AHL6,

(b) DNA sequences which hybridize to any of the foregoing DNA inserts and which code for a polypeptide of the IFN- $\alpha$  type and

(c) DNA sequences which on expression code for a polypeptide coded for on expression by any of the foregoing DNA sequences and inserts.

52. The method according to claim 51 comprising the additional step of introducing into said cloning vehicle an expression control sequence so as to permit expression of said DNA sequence.

53. A DNA sequence coding for an  $\alpha$ -type interferon selected from the group consisting of DNA sequences of the formula:

ATGGCCTGCCCTTGCTTTACTGATGGCCTGGTGGTGCAGCTGCAAGTCAGC  
TGCTCTCTGGCTGTGATCTCCCTGAGACCCACAGCCTGGATAACAGGAGGACCTTG  
ATGCTCCTGGCACAAATGAGCAGAATCTCTCCTCCTGTGATGGACAGACAT  
GACTTGGATTCCTCCCAGGAGGAGTTGATGGCAACCAGTTCCAGAAGGCTCCAGCC  
ATCTCTGTCCTCCATGAGCTGATCCAGCAGATCTTCAACCTCTTACCAAAAGAT  
TCATCTGCTGCTGGGATGAGGACCTCCTAGACAATTCTGCACCGAACTCTACCAAG  
CAGCTGAATGACTTGGAAAGCCTGTGATGCAGGAGGAGAGGGTGGAGAAACTCCC  
CTGATGAATGCCGACTCCATCTGGCTGTGAAGAAATCTTCCGAAGAACACTCTC  
TATCTGACAGAGAAGAAATACAGCCCTGTGCCTGGAGGTTGTCAGAGCAGAAATC  
ATGAGATCCCTCTTTATCAACAAACTGCAAGAAAGATTAAGGAGGAAGGAA

and

TGTGATCTCCCTGAGACCCACAGCCTGGATAACAGGAGGACCTGATGCTCCTGGCA  
CAAATGAGCAGAATCTCTCCTCCTCGTCTGATGGACAGACATGACTTTGGATTT  
CCCCAGGAGGAGTTGATGCCAACAGTCAGAAGGCTCCAGCCATCTCTGCTC  
CATGAGCTGATCCAGCAGATCTCAACCTCTTACCAAAAGATTCATCTGCTGCT  
TGGGATGAGGACCTCCTAGACAAATTCTGCACCGAACTCTACCAGCAGCTGAATGAC  
TTGGAAGCCTGTGTGATGCAGGAGGAGAGGGTGGGAGAAACTCCCCTGATGAATGCG  
GACTCCATCTGGCTGTGAAGAAATACTTCCGAAGAATCACTCTATCTGACAGAG  
AAGAAATAACAGCCCTGTGCCTGGAGGTTGTCAGAGCAGAAATCATGAGATCCCTC  
TCTTTATCAACAAACTTGCAAGAAAGATTAAGGAGGAAGGAA.

54. A DNA sequence coding for an  $\alpha$ -type interferon selected from the group consisting of DNA sequences of the formula:

TTACTGGTGGCCCTCCTGGTGTCAAGCTGCAAGTCAAGCTGCTCTGTGGGCTGTGAT  
CTGCCTCAAACCCACAGCCTGGTAGCAGGAGGACCTGATGCTCCTGGCACAGATG  
AGGAGAAATCTCTCTTCTCCTGCTGAAGGACAGACATGACTTTGGATTCCCCAG  
GAGGAGTTGGCAACCAGTCCAAAAGGCTGAAACCATCCCTGCTCCTCCATGAGATG  
ATCCAGCAGATCTCAATCTTCAGCACAAAGGACTCATCTGCTGCTTGGATGAG  
ACCCTCCTAGACAAATTCTACACTGAACTCTACCAGCAGCTGAATGACCTGGAAGCC  
TGTGTGATACAGGGGGTGGGGTGACAGAGACTCCCCTGATGAAGGAGGACTCCATT  
CTGGCTGTGAGGAAATACTTCCAAAGAATCACTCTATCTGAAAGAGAAGAAATAC  
AGCCCTTGTGCCTGGAGGTTGTCAGAGCAGAAATCATGAGATCTTTCTTGTCA  
ACAAACTTGCAAGAAAGTTAAGAAGTAAGGAA and  
TGTGATCTGCCTCAAACCCACAGCCTGGTAGCAGGAGGACCTGATGCTCCTGGCA  
CAGATGAGGAGAAATCTCTCTTCTCCTGCTGAAGGACAGACATGACTTTGGATTT  
CCCCAGGAGGAGTTGGCAACCAGTCCAAAAGGCTGAAACCATCCCTGCTCCTCCAT  
GAGATGATCCAGCAGATCTCAATCTTCAGCACAAAGGACTCATCTGCTGCTTGG  
GATGAGACCCCTCTAGACAAATTCTACACTGAACTCTACCAGCAGCTGAATGACCTG  
GAAGCCTGTGTGATACAGGGGGTGGGGTGACAGAGACTCCCCTGATGAAGGAGGAC  
TCCATTCTGGCTGTGAGGAAATACTTCCAAAGAATCACTCTATCTGAAAGAGAAG

AAATACAGCCCTTGTGCCTGGGAGGTTGTCAGAGCAGAAATCATGAGATCTTTCT  
TTGTCAACAAACTGCAAGAAAGTTAAGAAGTAAGGAA

55. A DNA sequence coding for an  $\alpha$ -type interferon selected from the group consisting of DNA sequences of the formula:

ATGCCCTGCTTTCTTACTGATGCCGTGCTGGTGCAGCTACAAATCCATC  
TGGTCTCTGGCTGTGATCTGCCTCAGACCCACAGCCTGGTAATAGGAGGACCTTG  
ATACTCCTGCAACAAATGGGAAGAACATCTCTCATTCTCCTGCCTGAAGGACAGACAT  
GATTCGGATTCCCCGAGGAGGAGTTGATGCCACCAGTCCAGAAGACTCAAGCC  
ATCTCTGCTCCATGAGATGATCCAGCAGACCTCAATCTTCAGCACAGAGGAC  
TCATCTGCTGCTGGAACAGAGCCTCCTAGAAAAATTCCACTGAACCTTACAG  
CAACTGAATGACCTGGAAGCAGCATGTGATAACAGGAGGTTGGGTGGAAGAGACTCCC  
CTGATGAATGTGGACTCCATCCTGGCTGTGAGGAAATACTTCAAAGAACATCACTCTT  
TATCTAACAGAGAAGAACATACAGCCCTTGTGCCTGGAGGTTGTCAGAGCAGAAATC  
ATGAGATCCCTCTGTTCAACAAACTGCAAAAAGATTAAGGAGGAAGGAT

and

TGTGATCTGCCTCAGACCCACAGCCTGGTAATAGGAGGACCTTGATACTCCTGCAA  
CAAATGGGAAGAACATCTCTCATTCTCCTGCCTGAAGGACAGACATGATTCGGATTC  
CCCGAGGAGGAGTTGATGCCACCAGTCCAGAACAGACTCAAGCCATCTGCTCCTC  
CATGAGATGATCCAGCAGACCTCAATCTTCAGCACAGAGGACTCATCTGCTGCT  
TGGGAACAGAGCCTCCTAGAAAAATTCCACTGAACCTTACAGCAACTGAATGAC  
CTGGAAGCATGTGATAACAGGAGGTTGGGTGGAAGAGACTCCCTGATGAATGTG  
GACTCCATCCTGGCTGTGAGGAAATACTTCAAAGAACATCACTCTTATCTAACAGAG  
AAGAACATACAGCCCTTGTGCCTGGAGGTTGTCAGAGCAGAAATCATGAGATCCCTC  
TCGTTTCAACAAACTGCAAAAAGATTAAGGAGGAAGGAT.

REMARKS

This application is a Rule 60 divisional  
application of pending application Serial No. 06/223,108